UBC Division of Cardiology Research Rounds

Registries – overview and design

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I respectfully acknowledge we live and work on the traditional and unceded territory of the Musqueam, Squamish and Tsleil-Waututh people.

What is a registry?

Registry:

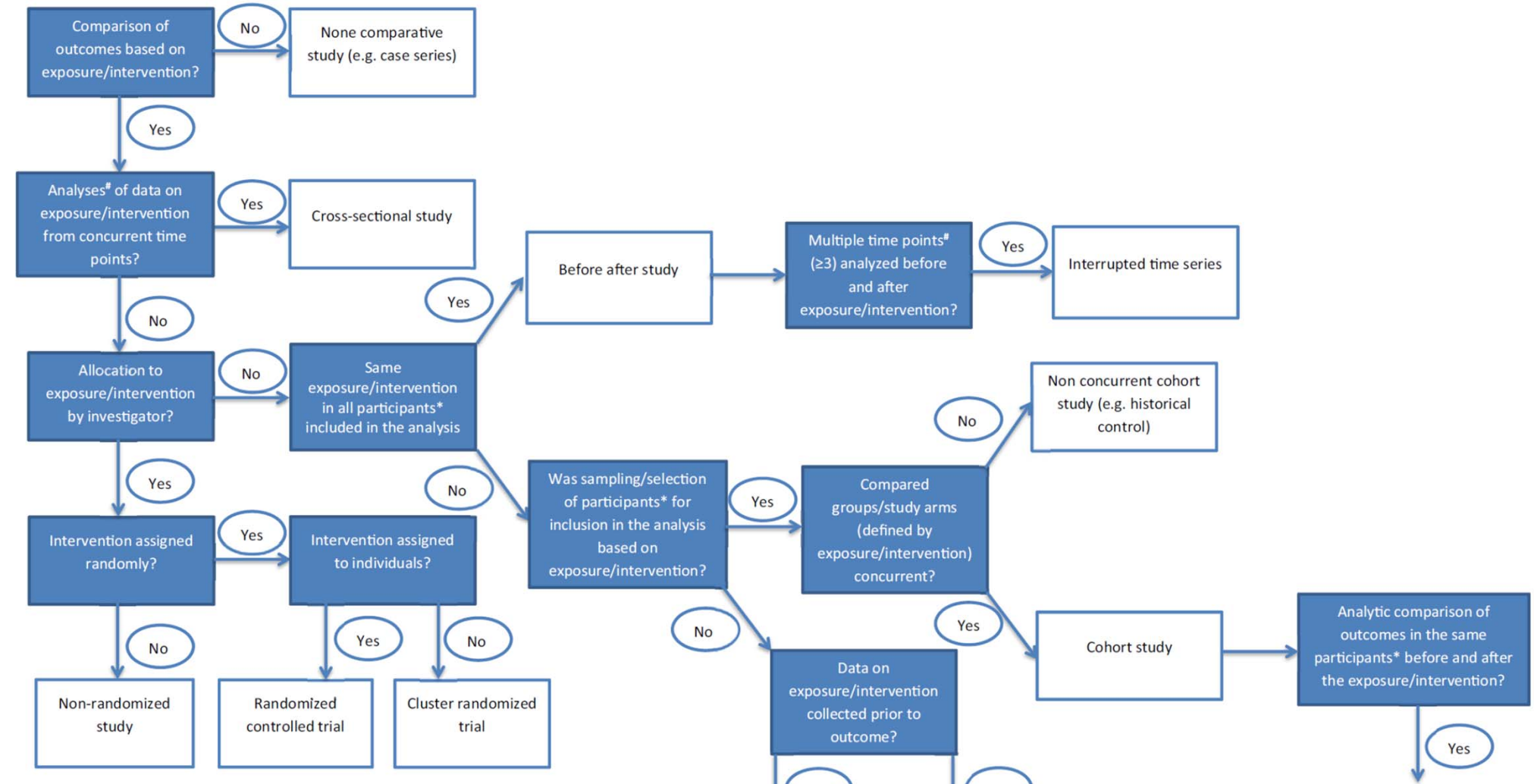
- collection of standardized information about a group of patients who share a condition or experience.

Database:

- collection of data or information, typically organized for ease and speed of search and retrieval

- usually type of observational study
- observe population over time
- no experimental intervention
- retrospective or prospective

Registry study design classification



*participants may be all possible units of analyzes, e.g. individuals, hospitals, practices

#or data for reanalyzes are available

†dotted line indicates that standard case-control studies are regularly not possible because cases and controls are nested in the registry cohort

Registry objectives/questions

- What is the natural course of a disease, and how does geographic location affect the course?
- Does a treatment lead to long-term benefits or harm, including delayed complications?
- How is disease progression affected by available therapies?
- What are significant predictors of poor outcomes?
- What is the safety profile of a specific therapy?
- How do clinical practices vary, and what are the best predictors of treatment practices?
- Are there disparities in the delivery and/or outcomes of care?
- What characteristics or practices enhance adherence?
- How do quality improvement programs affect patient outcomes?
- What process and outcomes metrics should be incorporated to track quality of patient care?
- Was an intervention program or risk-management activity successful?
- What are the resources used/economic parameters of actual use in typical patients?

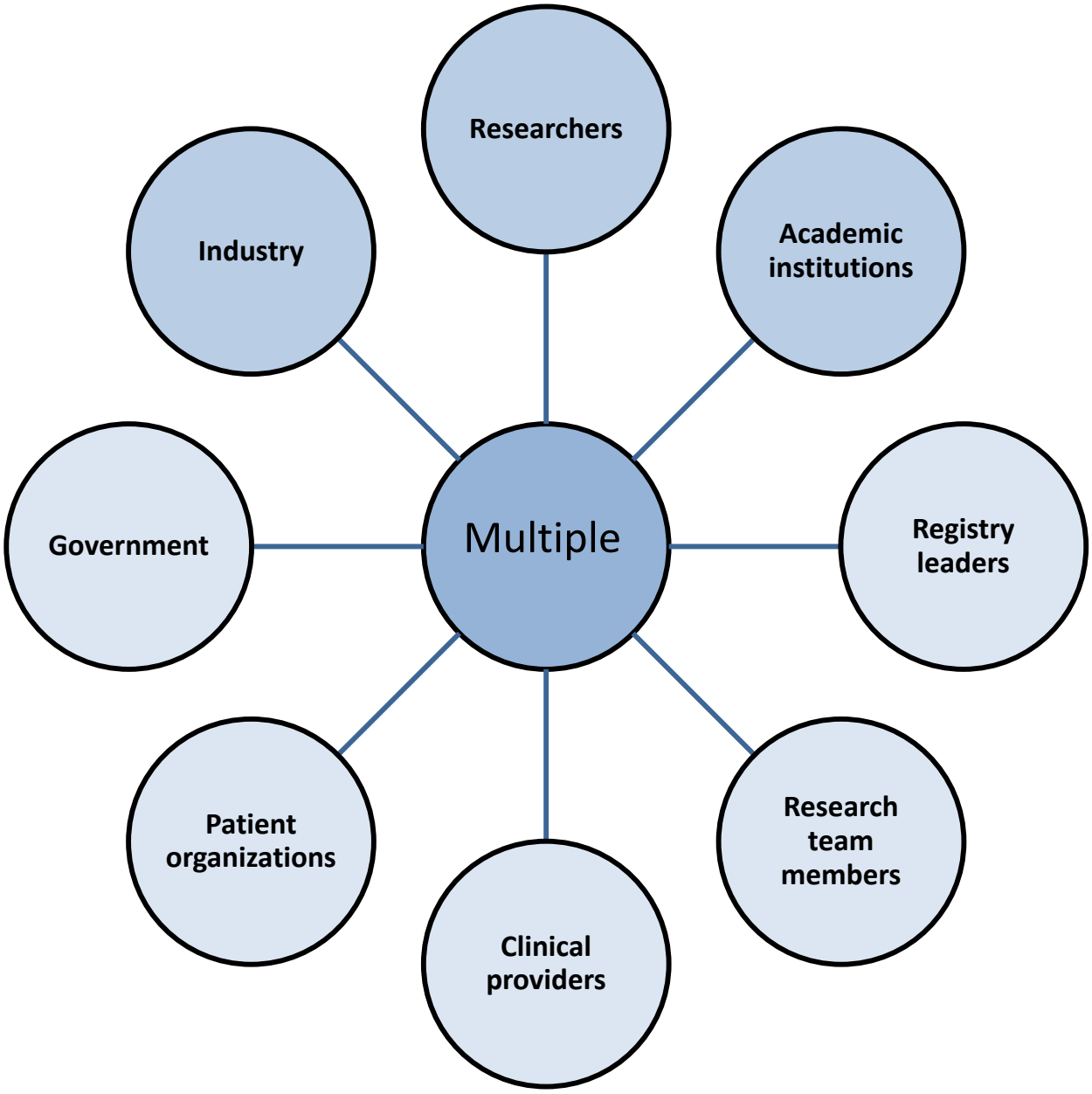
Agency for Healthcare Research and Quality (AHRQ). Registries for evaluating patient outcomes. 4th edition.

Registry purpose

Registry type	Description	Examples
Disease based		
1. Natural history	Specific condition/disease or subgroup From specific time point (e.g., diagnosis) until outcome/study end Enrollment any time or specific time Surveillance studies	Disease e.g., MI, stroke Clinical instrument development
Exposure based		
2. Effectiveness Clinical, cost, comparative	Exposure treatment, test/investigation Acute or chronic Supporting value-based care	Device e.g., ICD Medication
3. Monitoring safety, harm	Exposure product, treatment Adverse event monitoring Post-market product surveillance	
4. Quality	Exposure to healthcare service Guideline adherence Health system integrated	Hospitalizations Procedures Diagnostic test

Agency for Healthcare Research and Quality (AHRQ). Registries for evaluating patient outcomes. 4th edition.

Identify stakeholders

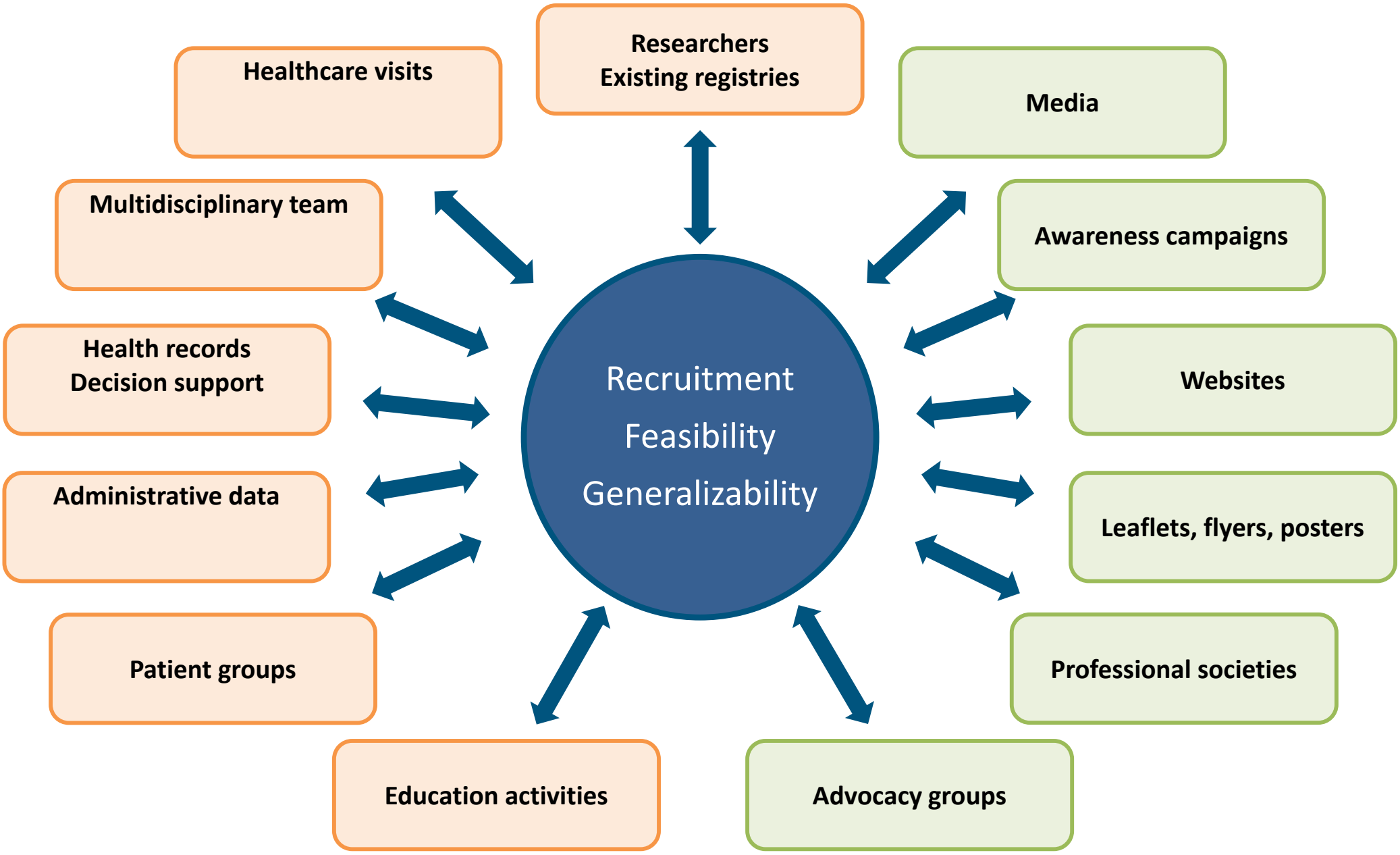


Population

Target population	Internal Validity Freedom from bias	External Validity Generalizability	Diversity

• Inclusion
• Exclusion
	• Non-randomized
	• Systematic error (bias)
	• Information bias
	• Indication bias
	• Subject misclassification
	• Attrition differential
		• Representative
		• Sampling frame
		• Selection bias
		• Recruitment methods
		• Compare with external sources
		• Attrition non-differential
			• Ethnicity
			  • Language
			  • Community engagement
			• Socioeconomic
			• Geographical
			• Age
			• Gender

Recruitment: multimodal active and passive



Recruitment

Benefits

- Participant learning
- Information/resources
- Helping others
- Advancing science

Risks

- Safety
- Confidentiality
- Compensate costs
- Understand withdrawal anytime

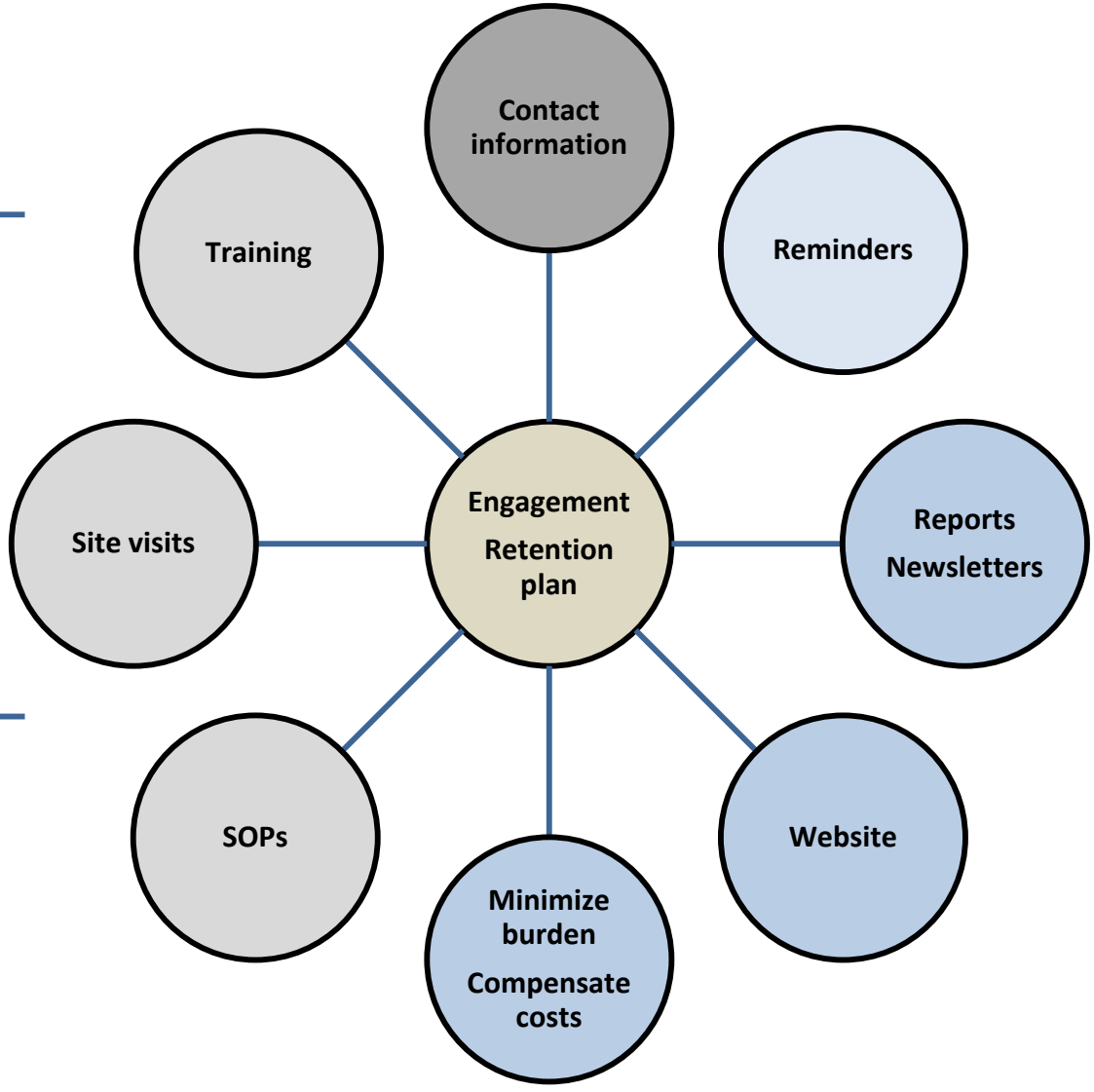
Attrition

LTFU Loss to follow-up

- Consider LTFU endpoints
- Registry versus administrative data
- Differential vs non-differential

With-drawal Withdrawal of consent

- Define extent:
  - Study visits
  - Medical records
  - Death records



Reporting

- Observational study
- STROBE checklist

Ref: https://www.equator-network.org/

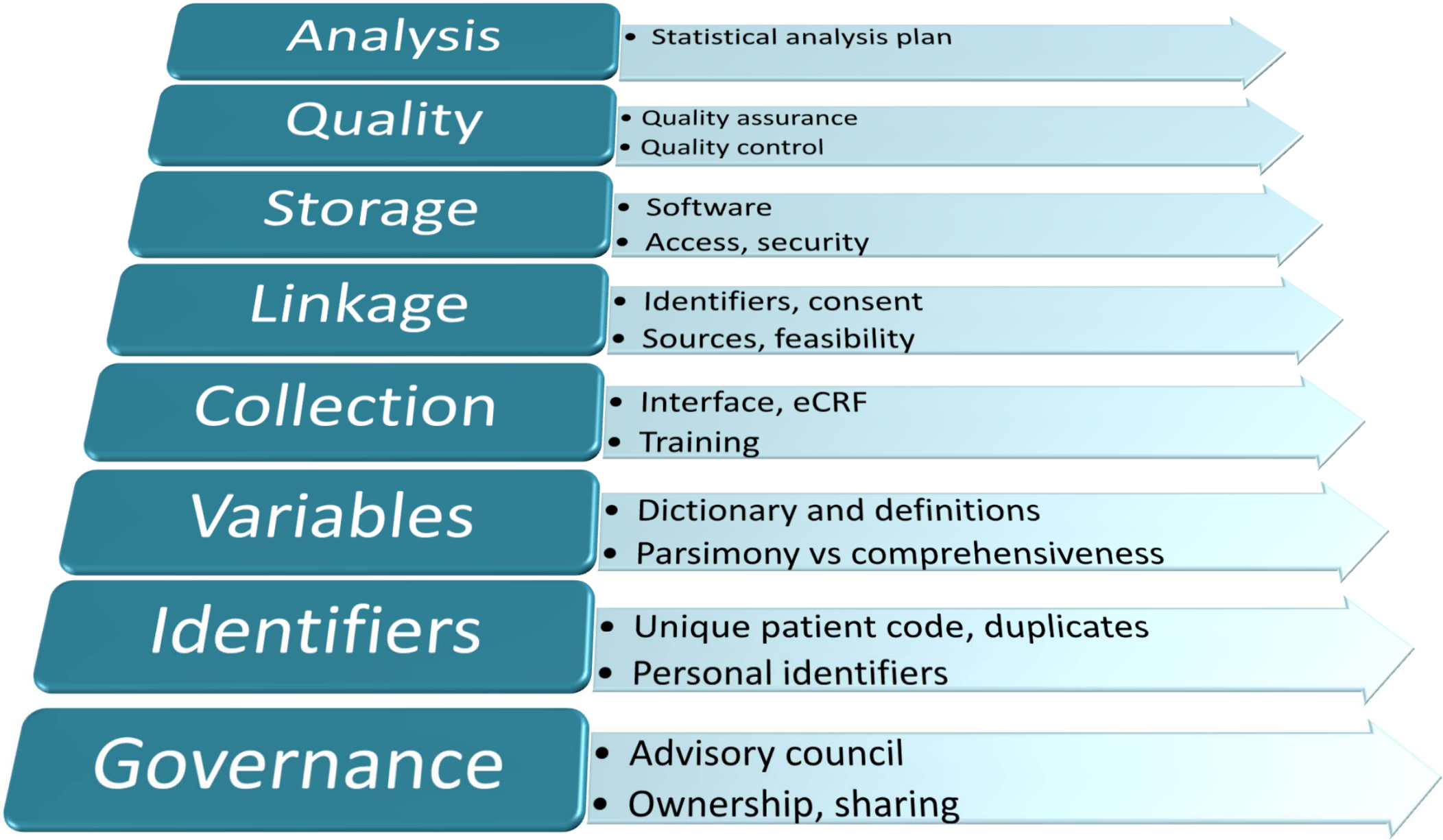
Table. **The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Checklist of Items That Should Be Addressed in Reports of Observational Studies**

Item	Item Number	Recommendation
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract. (b) Provide in the abstract an informative and balanced summary of what was done and what was found.
Introduction		
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported.
Objectives	3	State specific objectives, including any prespecified hypotheses.
Methods		
Study design	4	Present key elements of study design early in the paper.
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection.
Participants	6	(a) Cohort study: Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up. Case–control study: Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls. Cross-sectional study: Give the eligibility criteria, and the sources and methods of selection of participants. (b) Cohort study: For matched studies, give matching criteria and number of exposed and unexposed. Case–control study: For matched studies, give matching criteria and the number of controls per case.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group.
Bias	9	Describe any efforts to address potential sources of bias.
Study size	10	Explain how the study size was arrived at.
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why.
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding. (b) Describe any methods used to examine subgroups and interactions. (c) Explain how missing data were addressed. (d) Cohort study: If applicable, explain how loss to follow-up was addressed. Case–control study: If applicable, explain how matching of cases and controls was addressed. Cross-sectional study: If applicable, describe analytical methods taking account of sampling strategy. (e) Describe any sensitivity analyses.
Results		
Participants	13*	(a) Report the numbers of individuals at each stage of the study—e.g., numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed. (b) Give reasons for nonparticipation at each stage. (c) Consider use of a flow diagram.
Descriptive data	14*	(a) Give characteristics of study participants (e.g., demographic, clinical, social) and information on exposures and potential confounders. (b) Indicate the number of participants with missing data for each variable of interest. (c) Cohort study: Summarize follow-up time—e.g., average and total amount.
Outcome data	15*	Cohort study: Report numbers of outcome events or summary measures over time. Case–control study: Report numbers in each exposure category or summary measures of exposure. Cross-sectional study: Report numbers of outcome events or summary measures.
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence intervals). Make clear which confounders were adjusted for and why they were included. (b) Report category boundaries when continuous variables were categorized. (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period.
Other analyses	17	Report other analyses done—e.g., analyses of subgroups and interactions and sensitivity analyses.
Discussion		
Key results	18	Summarize key results with reference to study objectives.
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.
Generalizability	21	Discuss the generalizability (external validity) of the study results.
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based.

*Give such information separately for cases and controls in case–control studies, and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

An Explanation and Elaboration article (18–20) discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available at www.annals.org and on the Web sites of *PLoS Medicine* [www.plosmedicine.org] and *Epidemiology* [www.epidem.com]). Separate versions of the checklist for cohort, case–control, and cross-sectional studies are available on the STROBE Web site (www.strobe-statement.org).

Data management plan (DMP)

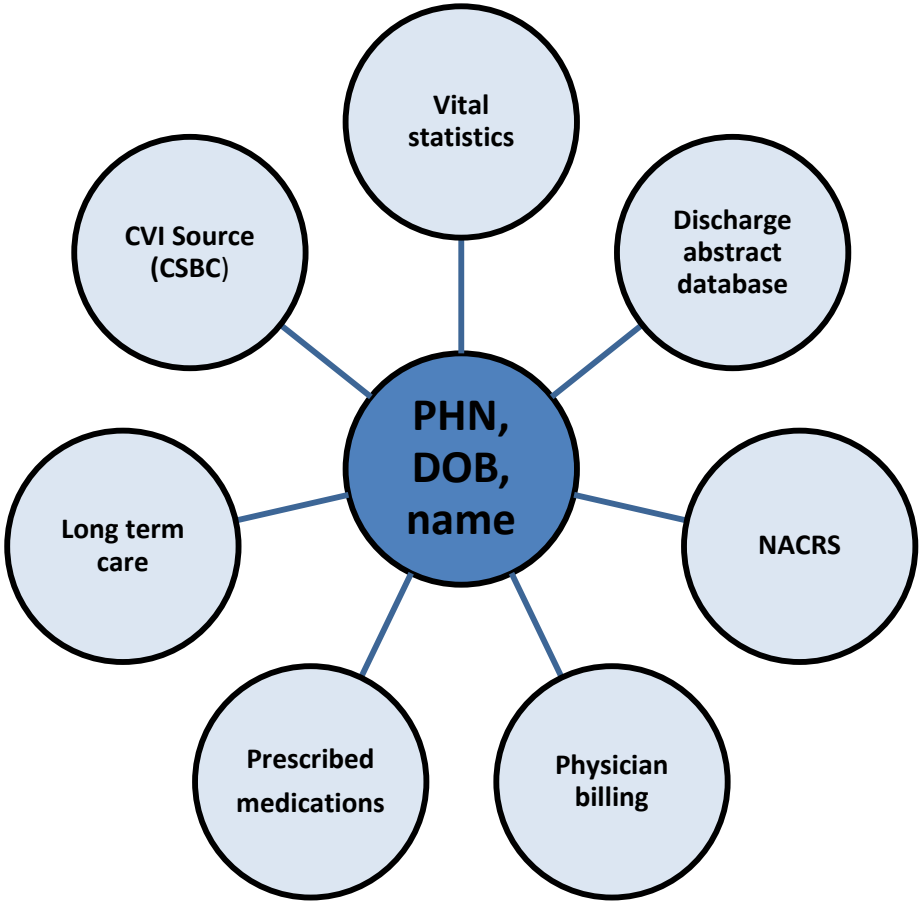


Data collection

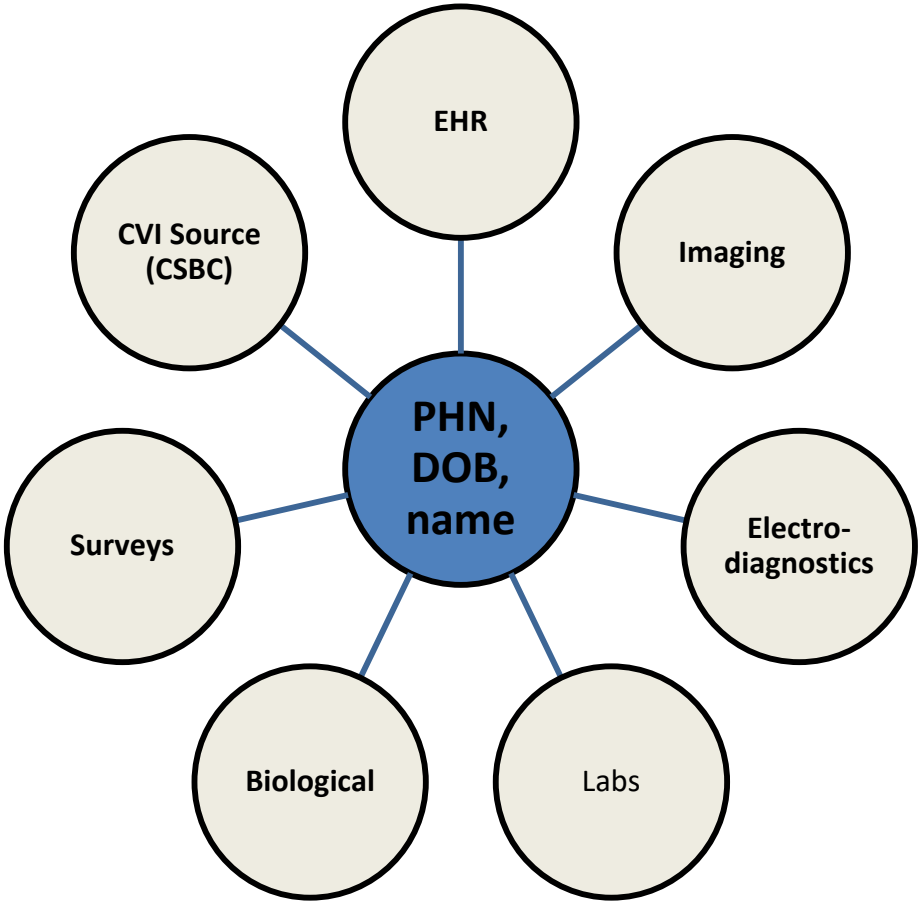
- Sources
  - EHR
  - graphics
  - patients
  - administrative data
- Abstraction
  - standardize definitions
  - training manual
- Case report form
  - logical and consistent
  - drop down menus, ranges
  - closed fields, avoid free text
  - upload source documents
  - interfacing
- Pilot
  - pilot test eCRF
  - involve research team and data manager

Data linkage

Administrative data



Additional sources



- **Include in consent**
- Feasibility: timelines, costs

Data quality: QA vs QC

Quality assurance (QA)

- process that maintains a desired level of quality
- **proactive** process

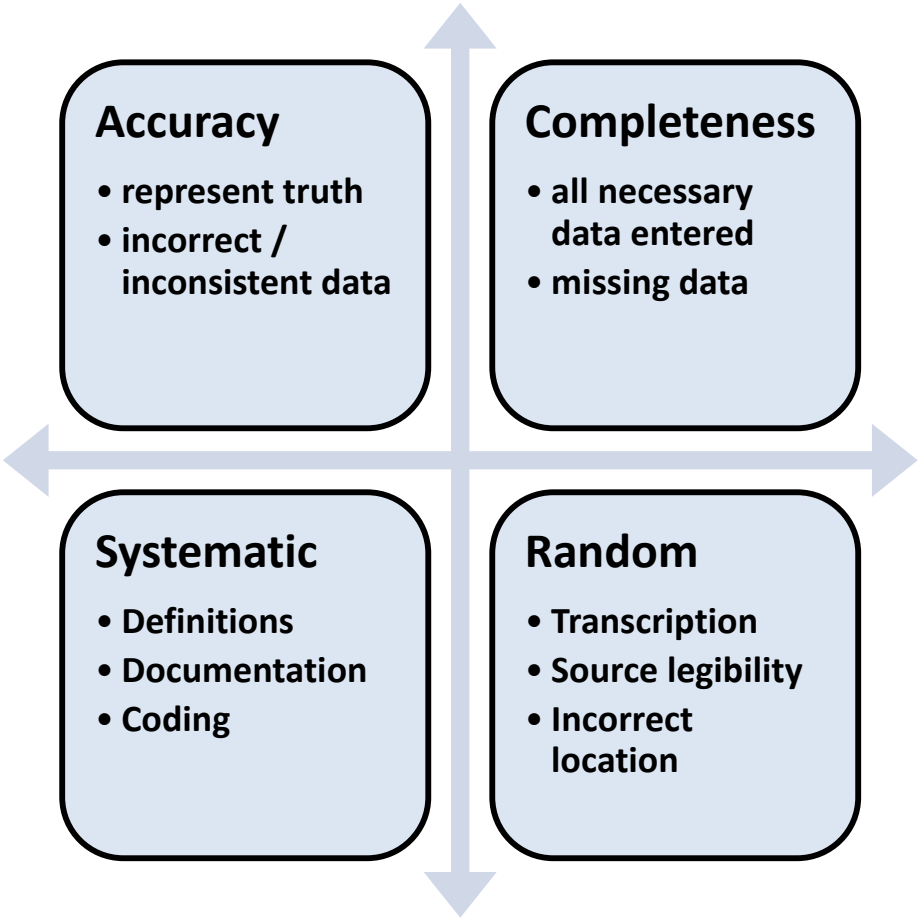
1. **prevention:** definitions, SOPs, training, user friendly data collection, direct data entry.
2. **detection:** monitoring, automated queries, audit.
3. **action:** correction, root cause analysis.

Quality control (QC)

- is the assessment of whether an outcome meets quality expectations
- **reactive** process once outcome achieved
- e.g., completeness checks, site visits

Data quality

Dimensions



Solutions

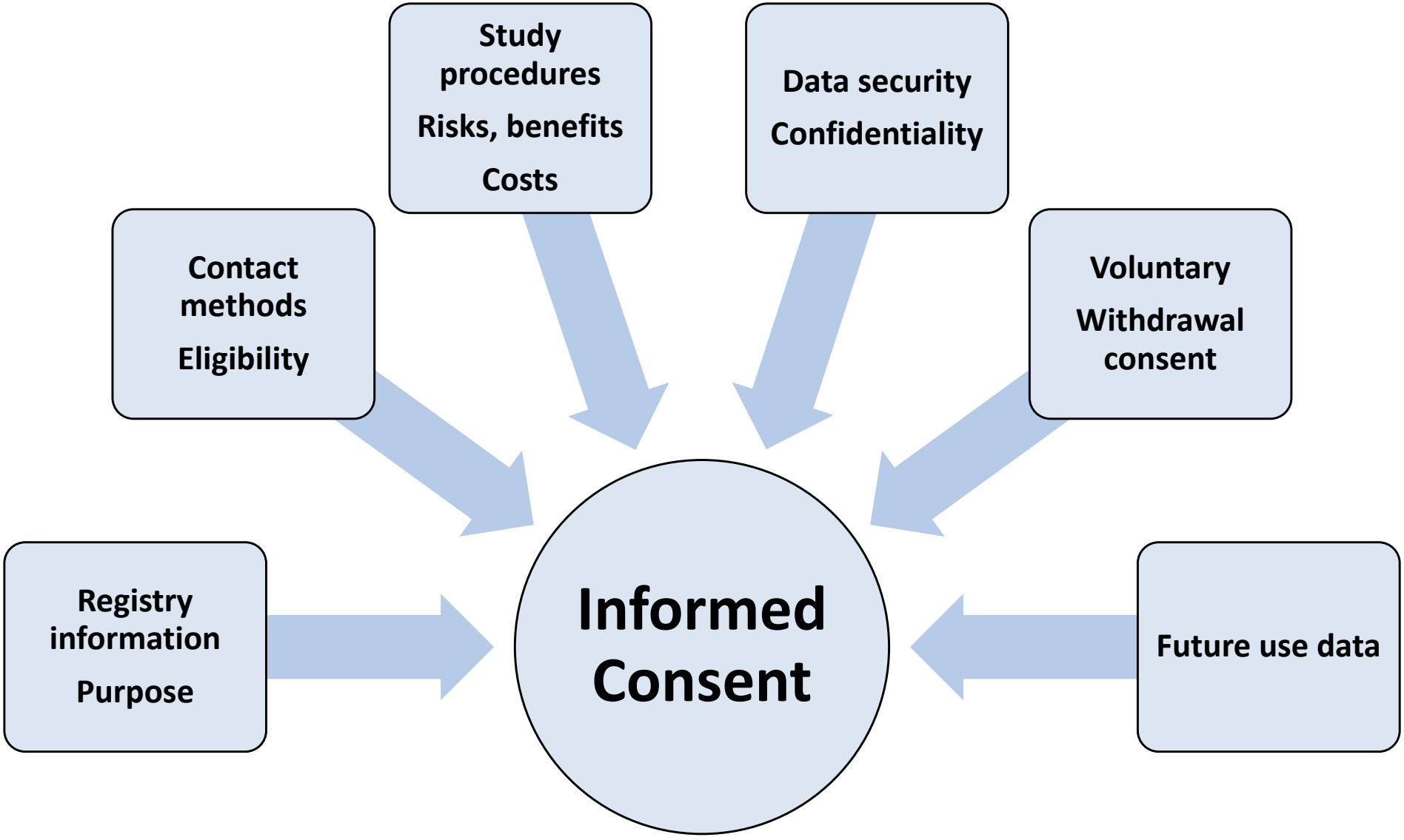
- Consult: epidemiologists, statisticians, databases specialists, other stakeholders
- eCRF design e.g., ranges.
- Pilot test, iterative deployment
- Regular database queries
- Team member dedicated to reviewing data
- Data cleaning and correction
- Periodic audit
- Procedures for handing missing data and site data collection variances

Consent

- opt in
- opt out
- consent to be contacted in routine clinical practice
- circle of care

Ref: Informed Consent for Registries - Registries for Evaluating Patient Outcomes - NCBI Bookshelf (nih.gov)

Informed consent: registries



Discussion